



Development of Mobile Learning for Distance Learning in Procurement Logistics Course (Case Study: Logistic Engineering Student Program UPI)

Aulia Zikri Rahman¹, Hizba Muhammad Sadida², Hanissa Okitasari³, Galuh Chisyti Nur Fadhilah⁴

^{1,2,3,4} Universitas Pendidikan Indonesia, Indonesia

Correspondence: E-mail: azikrirahman@upi.edu, hizba.sadida@upi.edu, hanissa.okitasari@upi.edu

ABSTRACTS

Logistics Engineering study program students are required to take several Core Expertise Courses at the Study Program, including among the list is logistics procurement courses. This subject is compulsory in the logistic science cluster because in a unified process of downstream goods in the logistics process cannot be separated from the role of procurement. In this course students will learn about how the procurement process takes place in a complete logistics cycle, but the complexity for this course is high enough that an alternative is needed that can be used as supporting student learning. With advances in information technology, existing learning methods can be enhanced to produce maximum and measurable output through indicators. This study aims to design and develop an independent learning mobile application for logistics procurement courses targeting students of the UPI Logistics Engineering study program. The first development step is to design and adopt this learning process into the application. The research was conducted with the intention of utilizing context-awareness computing to provide material personalization for each user and evaluation in the form of a quiz. In the final stage of research, the application made will be tested to determine the level of usability that will be applied in lectures. The expected result is a robust system and is expected to support blended learning to increase students' interest and understanding of logistics procurement courses.

ARTICLE INFO

Article History:

Submitted/Received 5 June 2021

First Revised 27 July 2021

Accepted 3 September 2021

Online Date 31 September 2021

Published Date 01 October 2021

Keyword:

Blended Learning,

Logistics,

Mobile Learning

1. INTRODUCTION

The learning process is supported by various methods, several types of approaches commonly used are pedagogy, andragogy, and heutagogy which are now widely discussed. Each approach has its own characteristics, both in terms of application and age maturity that can accept the learning method. For example, in pedagogy, the learning process must be carried out through supervision or centered on the educator as a teaching center with a relatively low level of learner maturity. Then switch to andragogy, which is a learning process that is intended for adults who are independent and can be responsible for their own choices and the role of educators is only as a mediator in a directed activity. Furthermore, there is the term heutagogy which at first glance has similarities with andragogy. In a heutagogical approach to teaching and learning, learners are highly autonomous and self-determined and emphasis is placed on development of learner capacity and capability with the goal of producing learners who are well-prepared for the complexities of today's workplace (Blaschke, 2012). Heutagogy aims to develop lifelong learners, making it an excellent theoretical fit for the fields of applied sciences like nursing, social work, and public health, all disciplines that routinely change with the development of new knowledge, devices, techniques, and research into best practices (Bhoynub et al., 2010). The illustration in Figure 1 explains the differences between each method.

The Difference Between Pedagogy, Andragogy, and Heutagogy

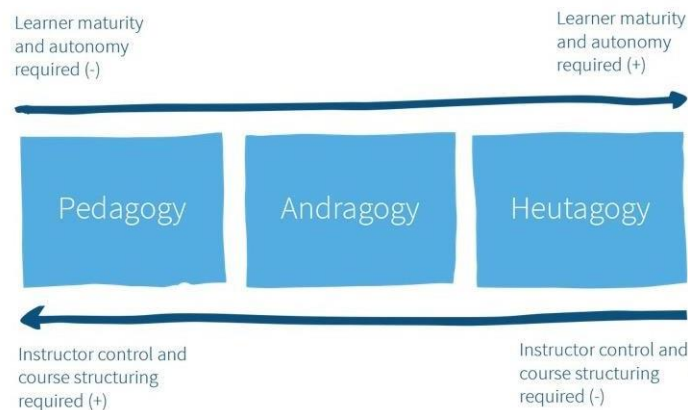


Figure 1. Education Learning Approach
(Source : <https://www.schoology.com/>)

The availability and use of information systems and technologies has grown almost to the point of being commodity like in nature, becoming nearly as ubiquitous as labor (Dewett & Jones, 2001). The rapid pace of information has changed the joints of the education sector gradually. In this case, there are a few things to note regarding the readiness of existing shifts (Wahyu Widodo et al., 2021). Development in information technology generated more choices for today's education, especially administration and teaching and learning process (Yang and Arjomand, 1999) (Purnomo et al., 2021). The information technology helps its innate originator i.e., education to flourish further by easing the different allied tasks in the sphere of education; not to mention, opening new subjects or points of interest in education.

Students of the Logistics Engineering study program are required to take several courses of study program expertise in semester 2, including the logistics procurement course. This course is mandatory in the field of logistics because in a single process the downstreaming of goods in the logistics process cannot be separated from the role of procurement. In this course, students will learn about how the procurement process takes place in a complete logistics cycle. In face-to-face learning classes, the lecturer will provide material along with foreign terms that will be found at the procurement stage.

Procurement logistics can be seen as part of material management related to physical acquisition and supply of required materials and goods (Deep et al., 2018). The core functions of procurement in this case can be divided into procurement planning, determining qualitative, quantitative and time related material requirements, as well as purchasing externally purchased objects. Subsequent duties include management of supply sources, search for potential vendors, request for quotations, evaluation and supervision of scheduled contract fulfillment. Procurement logistics has a fairly high complexity due to the different types of procurement for the desired needs.

Stock keeping includes planning warehouse and equipment, warehouse management, controlling the movement of materials and physical execution of warehouse tasks. This includes goods receipt and quality checks of goods placed and removed from stock, as well as additional internal warehouse processes, such as inventory. The actual provision involves commissioning, transfer and internal transportation, with the goal of transportation logistics getting the necessary materials to the right place at the right time at the minimum possible cost.

The COVID-19 pandemic has had a major impact on society, including the education system. The advent of COVID-19 has critically changed how we perceived the process of teaching and learning today (Ching & Roberts, 2020). To continue teaching, many educational institutions are shifting the offline teaching and learning process to an online system that allows students to do distance learning. This study aims to design and develop a self-learning mobile application for logistics procurement courses by targeting students of the UPI Logistics Engineering study program. The first development step is to design and adopt this learning process into the application. In the final stage of research, the application made will be tested to determine the level of usability that will be applied in lectures.

2. THEORITICAL BASIS

2.1. Mobile Learning

M-Learning is often interpreted as learning that utilizes mobile technology as a medium of delivery in learning. According to Geddes (Khan et al., 2015) "M-Learning is the acquisition of various knowledge and skills through the use of mobile technology, anywhere and anytime, which results in changes in behavior". According to Clark Quinn in RobbyRobson (Basak et al., 2018):

M-learning is defined as "The intersection of mobile computing and e-learning: accessible resources wherever you are, strong search capabilities, rich interaction, powerful support for effective learning, and performance-based assessment. E-learning independent of location in time or space".

Based on Clark Quinn's understanding of M-Learning, it can be interpreted that M-Learning has the advantages of resources that can be accessed anywhere and anytime, strong search capabilities, rich interactions, strong support for effective learning, and performance-based assessment. E-learning is not bound by space and time.

Referring to the several definitions of M-learning above, it can be concluded that M-Learning is a way of delivering learning that utilizes information and communication technology. M-Learning is the delivery of electronic learning materials on mobile computing devices so that they can be accessed from anywhere and anytime. The presence of M-Learning cannot be separated from the development of mobile technology at this time. According to Panji[5]:

“Mobile learning is made possible by the increasing number of existing mobile devices such as smartphones, tablet PCs, and mobile phones. Thus, the learning process can be personal and can be done anywhere and anytime.

2.2. Personalized Learning

Berri et al. (Tarus et al., 2017), present an ontology-based framework for context-aware mobile learning. This framework includes a rule-based ontology and search agent. First, an ontology tailored to the user's needs is obtained by applying a set of rules based on the user's profile. Then, the search agent selects a set of learning objects that meet the technical requirements of the generated ontology, and finally these are distributed to mobile devices.

Yu et al. (Gan et al., 2013), proposes the design of a recommendation system for e-learning, which provides learning content using semantic techniques. They used three ontological models built into the OWL: i) learning ontology, contextual information about the learning subject (eg, objectives, learning time); ii) learning content ontology, which involves the properties of each content and the relationship between them; and, iii) domain ontologies, which integrate domain-specific ontologies (eg, mathematics, computer science).

Soualah-Alila et al. (Garcia-Cabot et al., 2015), presented an adaptive m-learning system based on semantic modeling of learning content and learning context. The system consists of two levels: i) the semantic level, which includes the ontology built into OWL to represent the mobile context of five dimensions: learner profile, temporal, spatial, device, and learning content. It allows annotation of learning objects based on standards; and, ii) behavioral level, which uses a set of ontological and metaheuristic rules to offer learning objects adapted to the current context of the user.

3. METHODS

The development of mobile learning-based learning media applications for logistics procurement courses is research and development. In the introduction, the facts and reasons behind the proposer to raise the following research topic have been explained. To obtain data or information, the proposer reviews the existing learning system. This activity is carried out as an initial analysis stage with the aim of getting responses from the stakeholder's point of view on the ongoing learning process. The data at the initial analysis stage will be managed to obtain information regarding the advantages and disadvantages of the current learning method. The stages of this research activity are depicted in the following fishbone diagram.

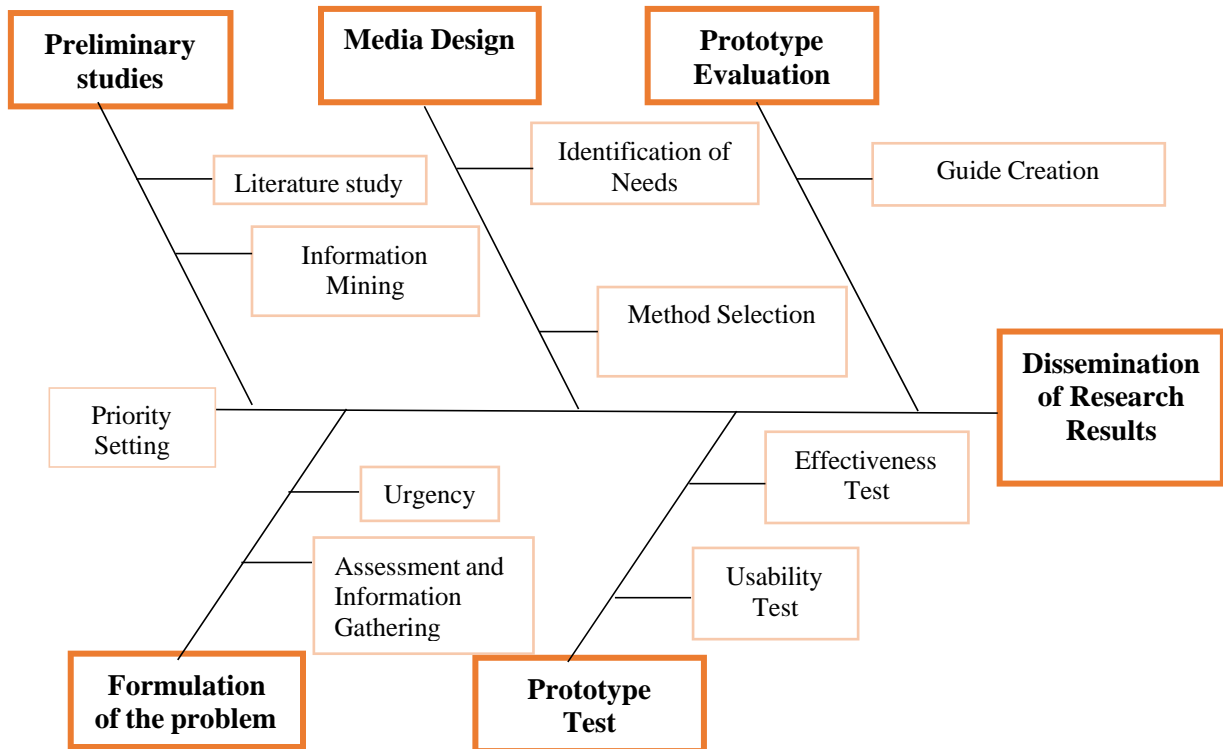


Figure 2. Steps in Research and Development

Then from the existing information, the problem formulations that have been described in the problem formulation section are carried out. Next, the proposing team formulates solutions to the problems found. After analyzing the solution, the next step is to analyze the needs needed at the implementation stage. Then to see how far the level of success of the solutions offered, an indicator or benchmark is also needed. Assessment indicators can be as diverse as measuring the level of productivity, effectiveness, and efficiency. Figure 2 describes the steps in the research method carried out by Sugiyono (Hanafi, 2017).

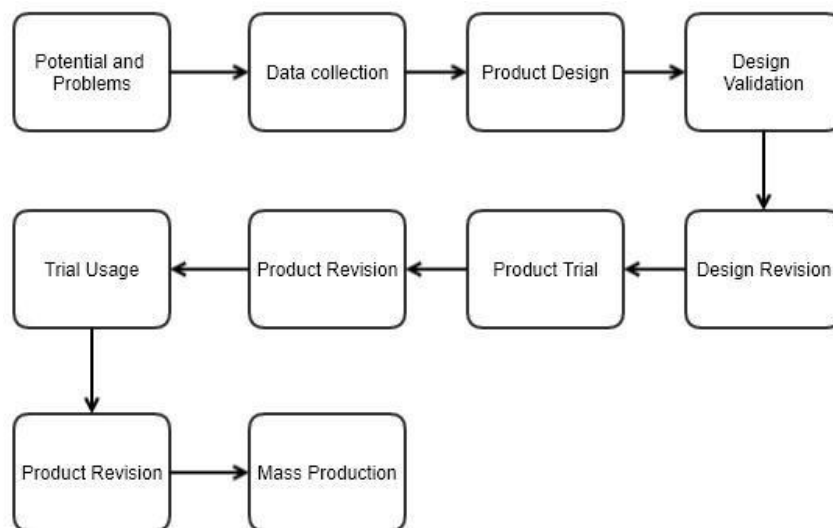


Figure 3. Steps in Research and Development

3.1. System Analysis

The process that has been running in the learning of logistics procurement courses is that there has been the use of information technology in the online learning process. All lecture activities are monitored through the use of Learning Management Systems such as SPOT UPI and SPADA. The process for recording student attendance, assignments, and uploading teaching materials has been carried out with the help of the system. From the results of initial observations made, the proposer sees that the level of use of information technology devices in logistics procurement courses is already high.

3.2. Requirement Analysis

The key in the new paradigm of education in the pandemic era with the learner as the center is the student involvement factor to take an active role and utilize ICT as a learning base. This method is very massively used and has been applied to the modern education system. The challenge that then arises is how educators can maximize the teaching that has been done without sacrificing the quality of teaching by minimizing the gap when compared to offline learning. The novelty of this research is to design a system to support existing lectures and maximize output by personalizing interactive learning media.

Although this is a challenge in providing appropriate learning media for each student because there are differences in achievement targets, the more challenging thing is to increase the awareness of the learners. A common way to attract learners is to use mobile devices as the main medium. Departing from the idea that each individual has a different learning path, this research is expected to provide the right personalization for each user. This personalization support is made possible by the use of context awareness computing, (Hwang, 2014).

3.3. Development Procedure

Blended learning media based on context-awareness computing was developed using four-D models (Amali et al., 2019) that consist of:

a. Definition Stage

At this stage the proposer defines the needs that will be implemented in the learning media. This stage includes several steps, namely learner analysis, concepts, and goal formulation.

b. Design Stage

At the design stage, the proposer will construct the existing learning media into a new format to be implemented into developer tools.

c. Development Stage

At the development stage, personalized materials are combined into a complete system through developer software. Furthermore, to find out how reliable the system that has been developed, then proceed with the prototype testing phase. After getting feedback from stakeholders, namely students and lecturers, it is necessary to test the validity of the material used as teaching material to the material validator.

d. Socialization Stage

At this stage, the application is ready to be published on a larger scale. In addition, the expected feedback at this stage is the level of usability and effectiveness of the use of media. In addition, it is hoped that the personalized one based on the user's needs can run as expected.

3.4. Prototype Development

The design of the prototype begins with the process of gathering needs in the form of interviews with stakeholders or in this study is the tutor of the course, then a method is determined for initializing the application and describing the learning style for each type. Next is the evaluation of the model designed by material experts. After the evaluation process, the prototype will be tested by the end-user. Then from the test continued with the evaluation process of the respondents' responses. Next is the finalization stage based on responses from users and the final report.

4. RESULTS AND DISCUSSION

Implementation of the designs described in Chapter III. The development of mobile learning-based learning media applications for logistics procurement courses aims to provide alternative learning other than those obtained in online lectures. In the introduction, the facts and reasons behind the proposer to raise the following research topic have been explained. To obtain data or information, the proposer reviews the existing learning system. This activity is carried out as an initial analysis stage with the aim of getting responses from the stakeholder's point of view on the ongoing learning process. The following figures are the development result from application.

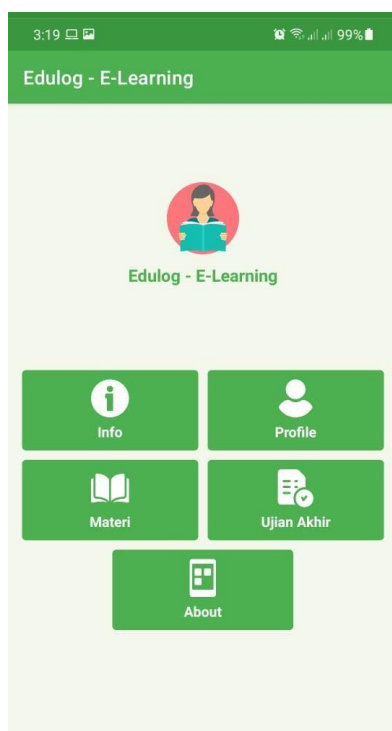


Figure 4. Main Menu

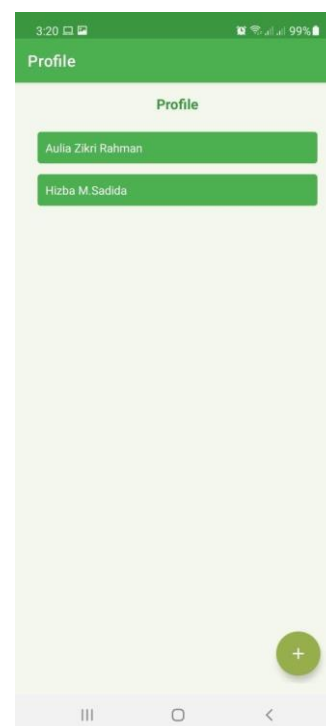


Figure 5. Profile Menu

Figures 4 are the main menu from Edulog application. It shown several menu that consist of information on how to use the application, profile menu, courses material, final exam, and the description menu. While in figures 5 shown the profile and addition of account for each user that can be seen in figure 6.



Figure 6. Adding Profile

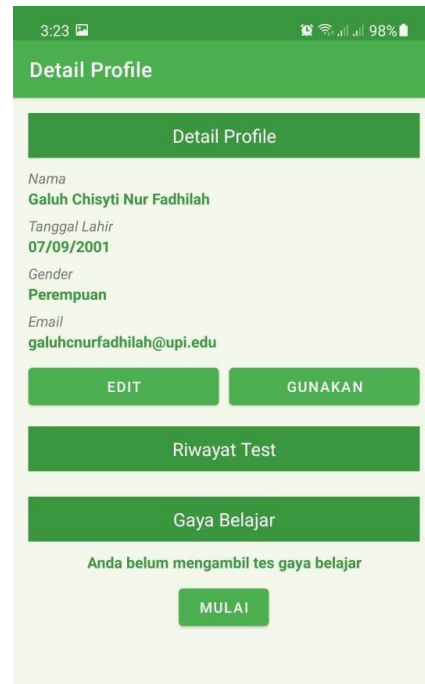


Figure 7. Detail Profile Menu

Figures 6 are the capture screen of addition profile menu. User asked to make an account for each profile. Figure 7 is the result of successful addition to the profile, user have the access to the history of the test and the menu for taking learning style test.



Figure 8. Test History

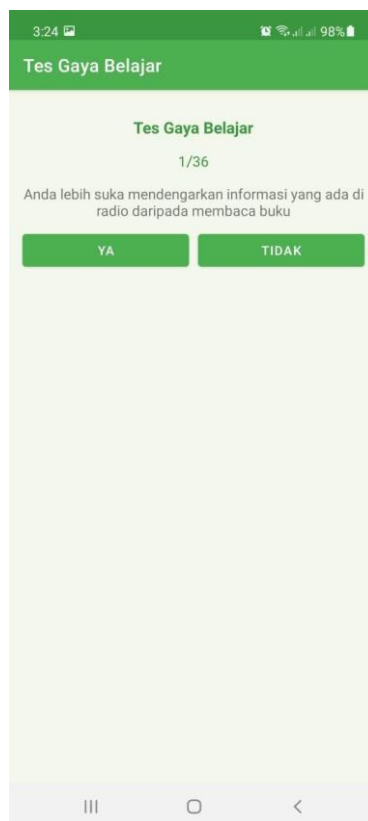


Figure 9. Learning Type Test

Figures 8 are the capture screen of test history that has been taken by the user from each courses. In addition, user can also see their mid term and final test progress. Figure 9 are the pages for learning type test.

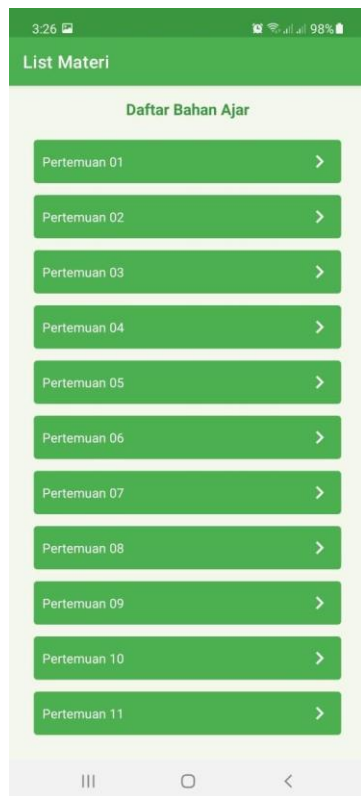


Figure 10. Courses Material Menu

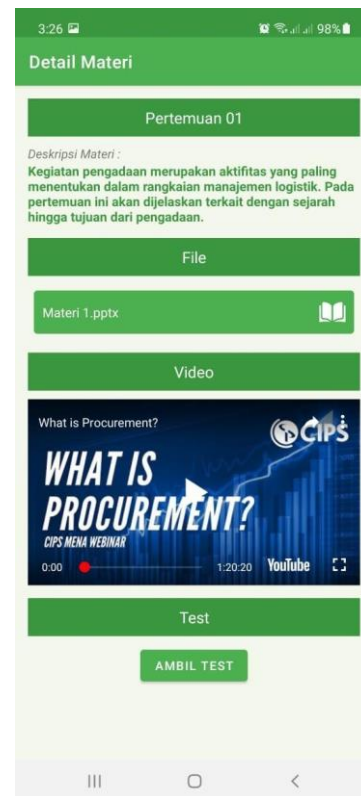


Figure 11. Detail of Courses

Figures 10 and 11 are the capture screen of courses material that a user can access for each courses. The material courses consist of the detail for respective meeting, the material, and the visualize video of the courses. The test took place in the Logistics Engineering Study Program with several students as the sources. During the development phase, authors also validate both application and material with the expert from another institution.

4. CONCLUSION

The following research shows the integration of Mobile Learning and the capabilities to do it remotely. On this research, author using the prototyping method to develop the program. By using this application, student can get the optional method for enhancing online learning activity. The future improvement from this system might be the improvement from the courses section and the use of other algorithm that could give more accuracy to the learning path of each students.

5. REFERENCES

- Amali, K., Kurniawati, Y., & Zulhiddah, Z. (2019). Pengembangan Lembar Kerja Peserta Didik Berbasis Sains Teknologi Masyarakat pada Mata Pelajaran IPA di Sekolah Dasar. *Journal of Natural Science and Integration*, 2(2), 191-202.
- Blaschke, L. M. (2012). Heutagogy and lifelong learning: A review of heutagogical practice and self-determined learning. *The International Review of Research in Open and Distributed Learning*, 13(1), 56-71.
- Bhoyrub, J., Hurley, J., Neilson, G. R., Ramsay, M., & Smith, M. (2010). Heutagogy: An alternative practice-based learning approach. *Nurse Education in Practice*, 10(6), 322–326.
- Ching, G. S., & Roberts, A. (2020). Evaluating the pedagogy of technology integrated teaching and learning: An overview. *International Journal of Research*, 9(6), 37-50.
- Deep, S., Gajendran, T., Jefferies, M., & Davis, P. (2018). An analytical literature review of risks in collaborative procurement. In *The Royal Institution of Chartered Surveyors-Annual Construction, Building and Real Estate Research Conference*, London, UK. Retrieved from <http://www.rics.org/Documents/COBRA> (Vol. 202018).
- Dewett, T., & Jones, G. R. (2001). The role of information technology in the organization: a review, model, and assessment. *Journal of management*, 27(3), 313-346.
- Gan, M., Dou, X., & Jiang, R. (2013). From ontology to semantic similarity: calculation of ontology-based semantic similarity. *The Scientific World Journal*, 2013.
- Garcia-Cabot, A., de-Marcos, L., & Garcia-Lopez, E. (2015). An empirical study on m-learning adaptation: Learning performance and learning contexts. *Computers & Education*, 82, 450-459.
- Hanafi, H. (2017). Konsep penelitian R&D dalam bidang pendidikan. *Saintifika Islamica: Jurnal Kajian Keislaman*, 4(2), 129-150.
- Hwang, G. J. (2014). Definition, framework and research issues of smart learning environments-a context-aware ubiquitous learning perspective. *Smart Learning Environments*, 1(1), 1-14.
- Khan, A. I., Al-Shihi, H., Al-Khanjari, Z. A., & Sarrab, M. (2015). Mobile Learning (M-Learning) adoption in the Middle East: Lessons learned from the educationally advanced countries. *Telematics and Informatics*, 32(4), 909-920.
- Kumar Basak, S., Wotto, M., & Belanger, P. (2018). E-learning, M-learning and D-learning: Conceptual definition and comparative analysis. *E-learning and Digital Media*, 15(4), 191-216.
- Purnomo, R., Priatna, W., & Yusuf, A. Y. P. (2021). Optimization of the Use of Information Technology in Learning Administration at SDN Hurip Jaya 03. *ABDIMAS: Jurnal Pengabdian Masyarakat*, 4(2), 925-930.
- Rahman, R., & Dar, B. A. (2021). Information technology in education: An Educational offshoot and a monumental add-on in return. *Journal of Trends in Computer Science and Smart Technology*, 4(3), 185-200.

- Tarus, J. K., Niu, Z., & Mustafa, G. (2018). Knowledge-based recommendation: a review of ontology-based recommender systems for e-learning. *Artificial intelligence review*, 50, 21-48.
- Widodo, A. W., Solikhatun, I., Raharja, S., Salam, A. A., & Wartini, F. S. (2021, February). A Utilization of Information Technology on Education in Indonesia (2017-2020): A Systematic Literature Review. In *Journal of Physics: Conference Series* (Vol. 1779, No. 1, p. 012024). IOP Publishing.
- Wisnu Wirawan, P. (2011). Pengembangan Kemampuan E-Learning Berbasis Web ke dalam M Learning. *Jurnal Masyarakat Informatika*, 2(4).
- Yang, N. & Arjomand, L. H. (1999). "Opportunities and Challenges in Computer- Mediated Business Education: An Exploratory Investigation of Online Programs," *Academy of Educational Leadership Journal*, 3 (2), 17-29.